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AUTHOR Morris, Lee A.; And Others
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ABSTRACT

The effects of classroom environment on students' achievement and perceptions of their learning environment were studied. The learning environment was categorized according to teachers' scores on the Open Education Teacher Questionnaire (OETQ). The scores on the OETQ were trichotomized to permit the formation of three groups--conventional, medium open, and high open. Achievement and student perception of the learning environment were measured by the Metropolitan Achievement Test and My Class Inventory. The data were analyzed by using a series of 3 x 1 ANOVAs. There were seven significant findings, all of which favored students in high-open and/or medium-open environments. (Author)

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OPEN EDUCATION: ACHIEVEMENT AND AFFECTIVE IMPACTS

Lee A. Morris, Michael Langenbach
and Herbert G. Richek

University of Oklahoma
Norman, Oklahoma

AMERICAN EDUCATION RESEARCH ASSOCIATION
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OPEN EDUCATION: ACHIEVEMENT AND AFFECTIVE IMPACTS

This country's relatively short educational history has been an arena for much discussion of educational ideas, methods, and movements. Many of these movements, with slight modification, originated in England and were transplanted to this country by educators who had visited English Schools. The way in which England has historically influenced education in America bears a striking resemblance to the growth of open education in school districts throughout the United States.

Featherstone (1967), in a series of articles in The New Republic, introduced the concept of open education to American educators and parents. Since that publication, interest in the approach suggests that it has become a serious alternative to the conventional self-contained classrooms.

The evolving nature of open education results in a considerable amount of misunderstanding of the concept and program variance. To conceptualize the approach and its progression from conventional methods to an open method, it is necessary to place Nyquist's (1972) description of conventional and open classrooms on a continuum. Figure I compares educational experiences of students in conventional classrooms with experiences of students in open classrooms.

FIGURE I -- Conventional Classroom and Open Classroom Continuum

Conventional Classroom	Open Classroom
1. information-gathering	1. problem solving
2. fact-centered	2. idea-centered
3. course-centered	3. experienced oriented
4. subject-centered	4. interdisciplinary
5. norm-referenced evaluation	5. individualized instruction and evaluation
6. teacher dominated	6. teacher-student planning
7. vicarious and confined to classroom	7. interaction with things and extends to community

At the conventional end of the continuum, tendencies of the teacher, the curriculum, and the learning process constitute the philosophic foundations of essentialism. Positions of these educationists appear to be consistent with a line of mainstream educators from Plato to programmed instruction advocates. These educators classify the curriculum into subjects, group learners by ability, and view knowledge as represented authoritatively by the teacher or in prescribed vicarious materials of instruction (Plowden Report 1967). The Plowden Report associates the psychological foundations of conventional classrooms with the names of Thorndike, Hull, Pavlov, Skinner, and other behaviorists.

Contrasting the conventional classroom is the open approach to teaching. The underlying philosophic principles of this approach are thought of in connection with the progressive work of Dewey, and the rights of children for which Rousseau argued. Advocates of the open education approach claim that the environment is much freer, more informal, highly individualized and gives the student a voice in planning the educational

program. Walberg and Thomas (1972) believe that educators at this end of the continuum have points of view which are "...consonant with developmental, humanistic, and clinical psychology."

Walberg and Thomas (1972) point out that "...there has been very little research and evaluation on open education, aside from testimonials by exponents and reporters." Their point is substantiated by an annotated bibliography on open education by the Toronto School Board (Ontario, 1972). The school board compiled a list of eighty-six annotations on open education.

Examination of the list of annotations showed that, with the exception of the Plowded Report, only three studies dealt with achievement in an evaluative manner. One study which used the Iowa Test of Basic Skills, concluded that there was no significant difference in the achievement of three open and three conventional third-grade classrooms. The other two studies were performed in England. Test results were not made available (Toronto School Board, 1972).

An examination of fifty projects, papers, and abstracts recorded with ERIC (1973) indicated that much attention has been directed toward the physical aspects of open education e.g., open architectural design, furniture, movable partitions, and flexible arrangements of space. Little attention was paid to student perception of the learning environment and achievement. The most recent study of open education (Wright, 1975) took into account both building design and teachers' orientation in an effort to compare students' achievement, cognitive ability, creativity and three measures of personality. Over a two and a half year period, the students were found to differ on several achievement variables (in favor of the conventional classrooms), but no difference was found on any of the cognitive or personality variables. Wright's use of teacher orientations in addition to their placement in buildings of

different architectural design was laudable but the relatively small sample size (two buildings, less than five teachers, and 100 students), leaves something to be desired when generalizing to larger populations.

While a review of related literature identified several studies comparing student achievement or organizational climate measured at the teacher level, none of the studies considered achievement and the students' perception of social climate. It would appear that before either or both of the variables (achievement and climate) can be assessed in terms of their impact, vis a' vis open and conventional classrooms, open education must be operationally defined.

Method

Instrumentation

The Open Education Teacher Questionnaire (OETQ) was developed by Walberg and Thomas (1972). The original instrument consisted of eight categories, the total of which was 50 items. Walberg and Thomas used content analysis to establish these categories. Our conceptualization of openness was based on an item analysis of the OETQ. The original categories were not replicated in our sample of 29 teachers. Instead, an internal consistency analysis yielded four subscales containing a total of 44 items. A Cronbach Alpha of the sum of all subscales for the teachers was .86.

The revised OETQ contained the following subscales:

1. Diagnosing, organizing and evaluating the learning environment -- This scale is characterized by the way teachers perceive the diagnostic-evaluative process and organization of the environment for instruction (13 items).

2. Teacher controlled and dominated environment -- This scale describes teacher tendencies which are associated with traditional education e.g., instructional activities are organized only by the teacher, classes are organized by grades and lessons are assigned to the class as a whole, etc. (13 items).

3. Seeking and expectations -- Scale three is defined by the way teachers seek professional growth and their expectation of pupils in terms of academic achievement (7 items).

4. Provisioning the physical environment -- This scale measures the extent to which diversified equipment and materials are provided for the learning environment (11 items).

Our primary concern at this point was to establish a reliable measure of openness.

The My Class Inventory (MCI) contains 45 items distributed over subscales of Satisfaction, Friction, Competitiveness, Difficulty and Cohesiveness.

Anderson (1971) conceptualized the five scales as,

> The Satisfaction scale is concerned with whether students are...well satisfied with the work of the class. Friction is thought of as lack of cooperation by certain members of the class. Competitiveness is concerned with students competing to see who can do the best work. Difficulty pertains to whether students are constantly challenged. The Cohesiveness scale examines whether members of a class are personal friends.

While individual scale reliabilities ranged from .54 to .77 for Anderson (1973), he maintained that the instrument had been used successfully in several research and evaluation studies. Unlike the OETQ, the subscales of the MCI in this research remained intact.

Sample

The population from which the sample was drawn consisted of fifty-seven kindergarten through fourth grade schools and two kindergarten through fifth grade schools of a southwestern metropolitan school system. Ten open-space and modified-space schools were randomly selected from the district's twenty architecturally open schools. Fifteen of the thirty-nine schools of conventional architectural design were randomly drawn.

A minimum of one teacher and her class were randomly drawn from each school's teacher-roster. Data were collected from these teachers and their students. Teachers with less than one year teaching experience in the school design in question were excluded from the study. The sample included second, third, and fourth grade students. Classes for gifted children, and the educationally mentally retarded children were not included in the study.

Data Collection

Following notification to principals that their schools would be involved, a visit was made to each school. Over a six-week period during the months of March and April, 1974, separate conferences were held with each of the teachers at which time the OETQ was administered. The teachers were asked to respond to the OETQ in terms of what was happening in the classroom, rather than what they thought should be happening.

While the teachers completed their instruments in separate settings, the investigators administered the MCI to students. Instructions for responding to the MCI items were read to students, as was each item of the instrument. This process was used in an effort to overcome lack of understanding of item concepts due to poor reading skills which some students may have been experiencing. Teacher and student instruments were collected before leaving the school.

The Metropolitan Achievement Tests (MAT) were administered to all students during the preceding six months.

Trichotomization of the Openness Scores

Utilizing the OETQ scores of the teachers as the basis for trichotomization, there were 410 usable protocols from white students and 144 from black students. Trichotomization was based on "gaps" in the distribution; e.g., the conventional schools category had a range of scores from 102 to 117, the medium open schools

range was from 118 to 133 and finally the high open schools were based on scores from 139 and above. For white children there were 147 pupils in the conventional category; in the medium open category 126; and in the high open 137. The N's for the black children were much smaller (144 total with 37 in the conventional group, 60 in the medium open and 47 in the high open).

Statistical Analyses

Before the analyses the available protocols of white and black children were separated. The rationale behind this procedure is quite straightforward, i.e., although there is no prior basis for believing that the groups of black and white children would differ on the affective i.e., the MCI variables, they might on the achievement variables. Because of a multiplicity of societal presses, black children do not achieve in school as well as do whites. This separation is an example of what Winer (1962) calls "direct control."

The number of useable protocols varied according to subtest and routine errors. In the former case, certain MAT variables were present for children in some grades, but not others. In the latter, some protocols were uninterpretable due to a variety of errors. The approximate ratios of useable protocols for white and black students was: 4 to 1 in the conventional, 2 to 1 in the medium open, and 3 to 1 in the high open classrooms.

A series of ANOVA's yielded F values for each variable vis a' vis the classroom categories and students' race. A Scheffe probability matrix was utilized for all significant F values.

FINDINGS

Table I shows the mean scores and F values for the classroom type of white and black students.

TABLE I

Mean Scores and F Values on MCI and MAT Variables for Students in Conventional, Medium High, and High Open Classrooms

	White				Black			
Classrooms	Conventional	Medium Open	High Open	F	Conventional	Medium Open	High Open	F
MCI Variables								
Satisfaction (n=541)	5.24	6.37	5.55	10.08**	5.14	5.75	6.22	n.s.
Friction (n=539)	6.07	5.06	6.02	9.86**	5.72	5.47	5.70	n.s.
Competition (n=550)	5.92	5.93	6.28	n.s.	6.30	6.23	6.09	n.s.
Cohesiveness (n=550)	6.06	6.44	6.09	n.s.	6.19	6.31	6.34	n.s.
Difficulty (n=536)	3.41	4.62	4.23	14.00**	4.27	3.93	4.61	n.s.
MAT Variables								
Word Knowledge (n=551)	33.26	30.31	32.99	3.99*	20.86	22.95	20.60	n.s.
Word Analysis (n=284)	27.54	26.22	27.53	n.s.	19.86	24.17	18.66	n.s.
Reading (n=268)	26.94	23.71	28.23	3.66*	16.83	17.36	20.44	n.s.
Reading Comprehension(n=283)	32.44	29.51	31.97	n.s.	23.77	23.06	21.00	n.s.
Total Reading (n=552)	62.35	57.76	63.34	3.64*	38.84	41.85	41.50	n.s.
Math Computation (n=546)	21.86	20.68	22.83	3.47*	15.72	19.24	16.02	3.68*
Math Concepts (n=545)	25.53	25.33	26.42	n.s.	16.17	19.29	18.74	n.s.
Problem Solving (n=545)	20.80	20.76	22.88	4.01*	13.15	14.93	15.89	n.s.
Total Math (n=549)	67.81	66.51	72.10	3.29*	43.11	53.46	49.57	3.83*
Language (n=268)	25.22	23.11	30.10	8.03*	16.00	17.83	17.67	n.s.
Spelling (n=428)	24.92	21.49	24.50	4.34*	17.35	18.53	17.05	n.s.

*P $<$ .05
**P $<$ .01

In total, 32 analyses yielded 13 significant differences between and among children in different classroom settings. The variables will be discussed below.

Satisfaction

For white students, the probability matrix from the Scheffe multiple comparison of means indicated that the difference was between the medium open classroom and both the conventional and high open, $F(2,396) = 10.08$, $p < .01$. There was no significant difference in mean scores for black students on the satisfaction variable.

Friction

The significant $F(2,393) = 9.86$, $p < .01$ for white students on the friction variable and the Scheffe analysis again indicated difference between the medium open and both the conventional and high open. The lower the score, the less perceived friction. For black students there was no significant difference in mean scores on the friction variable.

Difficulty

For white students, the most difficult or challenging learning environment was the medium open classroom, followed next by the high open, with the lowest expression of difficulty emanating from children in conventional classrooms. The $F(2,393) = 14.00$, $p < .01$, and the Scheffe matrix indicated that both the medium open and the high open classrooms differed significantly from conventional classrooms. There was no mean difference for black students on the difficulty variable.

Word Knowledge

For white students, the word knowledge variable was significant, $F(2,405) = 3.99$, $p < .05$. Multiple comparison of means showed a significant difference

TABLE II

VARIABLE: SATISFACTION

White Students Only				Black Students Only			
Group	N	Mean	S.D.	Group	N	Mean	S.D.
1. Conventional	140	5.24	2.44	1. Conventional	37	5.14	2.36
2. Medium Open	126	6.37	1.73	2. Medium Open	59	5.75	2.19
3. High Open	133	5.55	2.05	3. High Open	46	6.22	1.59

$P < .000051$

F - ratio = 10.08*

Probability Matrix for Scheffe Multiple Comparison of Means:

	1	2	3
1.	1.0000	0.0001	0.04873
2.	0.0001	1.0000	0.0075
3.	0.4873	0.0075	1.0000

*Homogeneity of Variance did not prevail. Homogeneity of Variance Test Chi-square = 15.53, Prob. = .0004.

$P < 0.063412$

F - ratio = 2.81*

Probability Matrix for Scheffe Multiple Comparison of Means:

	1	2	3
1.	1.0000	0.3730	0.0634
2.	0.3730	1.0000	0.5116
3.	0.0634	0.5116	1.0000

*Homogeneity of Variance did not prevail. Homogeneity of Variance Test Chi-square = 6.9643, Prob. = 0.0307.

TABLE III

VARIABLE: FRICTION

White Students Only				Black Students Only			
Group	N	Mean	S.D.	Group	N	Mean	S.D.
1. Conventional	138	6.07	2.09	1. Conventional	36	5.72	1.88
2. Medium Open	125	5.06	2.13	2. Medium Open	60	5.47	2.17
3. High Open	133	6.02	2.11	3. High Open	47	5.70	2.02

$P < 0.000073$

F - ratio = 9.86*

Probability Matrix for Scheffe Multiple Comparison of Means:

	1	2	3
1.	1.0000	0.0004	0.9805
2.	0.0004	1.0000	0.0010
3.	0.9805	0.0010	1.0000

*Homogeneity of Variance did prevail. Homogeneity of Variance Test Chi-square = 0.6591, Prob. = 0.7192

$P < 0.781462$

F - ratio = 0.25*

Probability Matrix for Scheffe Multiple Comparison of Means:

	1	2	3
1.	1.0000	0.8402	0.9990
2.	0.8402	1.0000	0.8410
3.	0.9990	0.8410	1.0000

*Homogeneity of Variance did prevail. Homogeneity of Variance Test Chi-square = 0.9518, Prob. = 0.6213

TABLE IV

VARIABLE: DIFFICULTY

White Students Only				Black Students Only			
Group	N	Mean	S.D.	Group	N	Mean	S.D.
1. Conventional	136	3.41	1.68	1. Conventional	37	4.27	1.98
2. Medium Open	125	4.62	2.17	2. Medium Open	57	3.93	1.92
3. High Open	135	4.23	1.84	3. High Open	46	4.61	1.78

P < 0.000007

F - ratio = 14.00*

Probability Matrix for Scheffe Multiple Comparison of Means:

	1	2	3
1.	1.0000	0.0000	0.0020
2.	0.0000	1.0000	0.2471
3.	0.0020	0.2471	1.0000

*Homogeneity of Variance did not prevail. Homogeneity of Variance Test Chi-square = 8.6800, Prop. = 0.0130.

P < 0.196712

F - ratio = 1.65*

Probability Matrix for Scheffe Multiple Comparison of Means:

	1	2	3
1.	1.0000	0.6959	0.7207
2.	0.6959	1.0000	0.1977
3.	0.7207	0.1977	1.0000

*Homogeneity of Variance did prevail. Homogeneity of Variance Test Chi-square = 0.4796, Prob. = 0.7868.

TABLE V

VARIABLE: WORD KNOWLEDGE

White Students Only			
Group	N	Mean	S.D.
1. Traditional	144	33.26	9.98
2. Medium Open	127	30.31	8.47
3. High Open	137	32.99	9.53

P < 0.019145

F-ratio = 3.99*

Homogeneity of Variance Test Chi-square = 3.6778
Prob. = 0.1590

Probability Matrix for Scheffe Multiple Comparison of Means:

	1	2	3
1.	1.0000	0.0360	0.9711
2.	0.0360	1.0000	0.0684
3.	0.9711	0.0684	1.0000

*Homogeneity of Variance did prevail.

Black Students Only			
Group	N	Mean	S.D.
1. Traditional	36	20.86	10.40
2. Medium Open	60	22.95	10.36
3. High Open	47	20.60	9.26

P < 0.418286

F-ratio = 0.88*

Homogeneity of Variance Test Chi-square = 0.7701
Prob. = 0.6804

Probability Matrix for Scheffe Multiple Comparison of Means:

	1	2	3
1.	1.0000	0.6142	0.9929
2.	0.6142	1.0000	0.4849
3.	0.9929	0.4849	1.0000

*Homogeneity of Variance did prevail.

between medium open classrooms and conventional classrooms, but not between medium open and high open. There were no significant differences among the trichotomized groups of black students.

Reading

For white students the reading variable was significant, $F(2,191) = 3.66$, $p < .05$. The probability matrix for Scheffe multiple comparison of means indicated a significant difference between students in high open and the medium open classrooms, but not between the high open and conventional categories. There was no difference in mean scores for black children.

Total Reading

Total reading for white students achieved a significant $F(2,405) = 3.64$, $p < .05$. Mean differences reflected by the Scheffe matrix were between the high open and medium open environments. There were no differences among the groups of black students.

Math Computation

There was a significant $F(2,403) = 3.47$, $p < .05$ for white students on the math computation variable. Multiple comparison of means showed a significant difference favoring high open classrooms over medium open classrooms.

While the $F(2,137) = 3.68$, $p < .05$ for the groups of black students was significant, the Scheffe probability matrix revealed $p < .10$ between the medium open and both the conventional and high open categories. Scheffe (1953) recommends the use of an alpha $p < .10$ for his test because it is so conservative.

Problem Solving

The significant $F(2,402) = 4.01$, $p < .05$ for white students on the problem solving variable and the Scheffe matrix showed a difference between the high open

TABLE VI

VARIABLE: READING

White Students Only				Black Students Only			
Group	N	Mean	S.D.	Group	N	Mean	S.D.
1. Traditional	87	26.94	8.26	1. Traditional	23	16.83	7.09
2. Medium Open	45	23.71	8.80	2. Medium Open	42	17.36	6.70
3. High Open	62	28.23	9.12	3. High Open	9	20.44	3.91

$P < 0.027551$

F-ratio = 3.66*

Homogeneity of Variance Test Chi-square = 0.7337
Prob. = 0.6929

Probability Matrix for Scheffe Multiple Comparison of Means:

	1	2	3
1.	1.0000	0.1300	0.6729
2.	0.1300	1.0000	0.0310
3.	0.6729	0.0310	1.0000

*Homogeneity of Variance did prevail.

$P < 0.362034$

F-ratio = 1.03*

Homogeneity of Variance Test Chi-square = 3.3363
Prob. = 0.1886

Probability Matrix for Scheffe Multiple Comparison of Means:

	1	2	3
1.	1.0000	0.9526	0.3800
2.	0.9526	1.0000	0.4453
3.	0.3800	0.4453	1.0000

*Homogeneity of variance did prevail.

TABLE VII

VARIABLE: TOTAL READING

White Students Only				Black Students Only			
Group	N	Mean	S.D.	Group	N	Mean	S.D.
1. Traditional	144	62.35	17.97	1. Traditional	37	38.84	18.62
2. Medium Open	127	57.76	17.32	2. Medium Open	60	41.85	17.26
3. High Open	137	63.34	18.18	3. High Open	47	41.50	16.12

P < 0.027096

F-ratio = 3.64*

Homogeneity of Variance Test Chi-square = 0.3331
Prob. = 0.8466

Probability Matrix for Scheffe Multiple Comparison of Means:

	1	2	3
1.	1.0000	0.1092	0.8964
2.	0.1092	1.0000	0.0409
3.	0.8964	0.0409	1.0000

*Homogeneity of Variance prevailed (adjusted F = 4.02 P = .03).

P < 0.683561

F-ratio = 0.38*

Homogeneity of Variance Test Chi-square = 0.8391
Prob. = 0.6573

Probability Matrix for Scheffe Multiple Comparison of Means:

	1	2	3
1.	1.0000	0.7064	0.7836
2.	0.7064	1.0000	0.9943
3.	0.7836	0.9943	1.0000

*Homogeneity of Variance did prevail (adjusted F = .63, ns).

TABLE VIII

VARIABLE: MATH COMPUTATION

White Students Only			
Group	N	Mean	S.D.
1. Traditional	144	21.86	6.33
2. Medium Open	126	20.68	6.12
3. High Open	136	22.83	7.26

P < 0.031962

F-ratio = 3.47*

Homogeneity of Variance Test Chi-square = 4.4333
Prob. 0.1090

Probability Matrix for Scheffe Multiple Comparison of Means:

	1	2	3
1.	1.0000	0.3432	0.4703
2.	0.3432	1.0000	0.0321
3.	0.4703	0.0321	1.0000

*Homogeneity of Variance did prevail

Black Students Only			
Group	N	Mean	S.D.
1. Traditional	36	15.72	7.51
2. Medium Open	59	19.24	7.74
3. High Open	45	16.02	6.24

P < 0.027745

F-ratio 3.68*

Homogeneity of Variance Test Chi-square = 2.3846
Prob. = 0.3035

Probability Matrix for Scheffe Multiple Comparison of Means:

	1	2	3
1.	1.0000	0.0747	0.9829
2.	0.0747	1.0000	0.0837
3.	0.9829	0.0837	1.0000

*Homogeneity of Variance did prevail.

TABLE IX

VARIABLE: PROBLEM SOLVING

White Students Only			
Group	N	Mean	S.D.
1. Traditional	143	20.80	6.87
2. Medium Open	126	20.76	6.57
3. High Open	136	22.88	7.67

$P < 0.018952$

F-ratio = 4.01*

Homogeneity of Variance Test Chi-square = 3.3592
Prob. = 0.1864

Probability Matrix for Scheffe Multiple Comparison of Means:

	1	2	3
1.	1.0000	0.9992	0.0488
2.	0.9992	1.0000	0.0533
3.	0.0488	0.0533	1.0000

*Homogeneity of Variance prevailed.

Black Students Only			
Group	N	Mean	S.D.
1. Traditional	34	13.15	6.20
2. Medium Open	59	14.93	6.45
3. High Open	47	15.89	4.80

$P < 0.118547$

F-ratio = 2.17*

Homogeneity of Variance Test Chi-square = 4.5364
Prob. = 0.1035

Probability Matrix for Scheffe Multiple Comparison of Means:

	1	2	3
1.	1.0000	0.3735	0.1207
2.	0.3735	1.0000	0.7060
3.	0.1207	0.7060	1.0000

*Homogeneity of Variance prevailed.

and the medium open settings. There were no significant differences for the three groups of black students.

Total Math

For white students, there was significance on the total math variable, $F\ (2,404) = 3.29$, $p < .05$. However, when means were analyzed by the Scheffe technique, the difference between the high open and medium open settings was $p < .10$.

The $F\ (2,139) = 3.83$, $p < .05$ for black students on the total math variable and analysis of the Scheffe indicated a significant mean difference between the medium open and the conventional settings.

Language

On the language variable for white children the $F\ (2,191) = 8.03$, $p < .01$ and the multiple comparison of means reflected differences between the high open group and both medium open and conventional classrooms. There were no significant differences for black children on the language variable.

Spelling

The spelling variable for white children was $F\ (2,327) = 4.34$, $p < .05$. A mean difference existed between the conventional and the medium open classrooms. There were no significant differences for black children.

DISCUSSION AND CONCLUSION

The central purpose of this study was to determine if open classroom environments differed significantly from conventional classroom environments

TABLE X

VARIABLE: TOTAL MATH

White Students Only				Black Students Only			
Group	N	Mean	S.D.	Group	N	Mean	S.D.
1. Traditional	144	67.81	18.55	1. Traditional	36	43.11	18.06
2. Medium Open	127	66.51	17.06	2. Medium Open	59	53.46	18.21
3. High Open	136	72.10	20.02	3. High Open	47	49.57	16.69

$P < 0.038155$

F-ratio = 3.29*

Homogeneity of Variance Test Chi-square = 3.2984
Prob. = 0.1922.

Probability Matrix for Scheffe Multiple Comparison of Means:

	1	2	3
1.	1.0000	0.8482	0.1584
2.	0.8482	1.0000	0.0533
3.	0.1584	0.0533	1.0000

*Homogeneity of Variance prevailed (adjusted F = 3.55 p = .03).

$P < 0.024091$

F-ratio = 3.83*

Homogeneity of Variance Test Chi-square = 0.4261
Prob. = 0.8081.

Probability Matrix for Scheffe Multiple Comparison of Means:

	1	2	3
1.	1.0000	0.0241	0.2595
2.	0.0241	1.0000	0.5336
3.	0.2595	0.5336	1.0000

*Homogeneity of Variance did prevail (adjusted F = 4.79 P = .01).

TABLE XI

VARIABLE: LANGUAGE

White Students Only				Black Students Only			
Group	N	Mean	S.D.	Group	N	Mean	S.D.
1. Traditional	87	25.22	9.79	1. Traditional	23	16.00	10.38
2. Medium Open	45	23.11	8.83	2. Medium Open	42	17.83	6.90
3. High Open	62	30.10	9.60	3. High Open	9	17.67	9.57

P < 0.000448

F-ratio = 8.03*

Homogeneity of Variance Test Chi-square = 0.6181
Prob. = 0.7341

Probability Matrix for Scheffe Multiple Comparison of Means:

	1	2	3
1.	1.0000	0.4843	0.0096
2.	0.4843	1.0000	0.0011
3.	0.0096	0.0011	1.0000

*Homogeneity of Variance did prevail.

P < 0.696328

F-ratio = 0.36*

Homogeneity of Variance Test Chi-Square = 5.2109
Prob. = 0.0739

Probability Matrix for Scheffe Multiple Comparison of Means:

	1	2	3
1.	1.0000	0.7053	0.8816
2.	0.7053	1.0000	0.9986
3.	0.8816	0.9986	1.0000

*Homogeneity of Variance did prevail.

TABLE XII

VARIABLE: SPELLING

White Students Only				Black Students Only			
Group	N	Mean	S.D.	Group	N	Mean	S.D.
1. Traditional	110	24.92	10.07	1. Traditional	26	17.35	12.48
2. Medium Open	110	21.49	9.01	2. Medium Open	30	18.53	11.33
3. High Open	110	24.50	9.11	3. High Open	42	17.05	9.22

P < 0.013752

F-ratio = 4.34*

Homogeneity of Variance Test Chi-square = 1.6612
Prob. = 0.4358

Probability Matrix for Scheffe Multiple Comparison of Means:

	1	2	3
1.	1.0000	0.0271	0.9471
2.	0.0271	1.0000	0.0615
3.	0.9471	0.0615	1.0000

*Homogeneity of Variance did prevail

P < 0.840849

F-ratio = 0.17*

Homogeneity of Variance Test Chi-square = 3.1126
Prob. = 0.2109

Probability Matrix for Scheffe Multiple Comparison of Means:

	1	2	3
1.	1.0000	0.9195	0.9939
2.	0.9195	1.0000	0.8479
3.	0.9939	0.8479	1.0000

*Homogeneity of Variance did prevail

on 5 affective variables and 11 achievement variables. Differences were analyzed by the Scheffe multiple comparison of means for trichomotized categories of white and black students.

Our data indicated that, for white students, there was a positive relationship between 3 affective variables and medium open or high open classrooms, i.e., satisfaction, friction and difficulty. Data on the competition and cohesiveness variables showed no significant differences between conventional and open settings for white or black students. It is of interest to note that black children perceived no differences among the three classroom environments on any of the affective variables. Therefore, it seems safe to conclude that unlike comparisons for white children, openness or conventionalism of classroom milieu appeared not to influence MCI variables for black children.

There were 10 significant findings on the 11 achievement variables for white and black students (i.e., 8 for white students and 2 for black students). Seven of the 8 significant achievement variables favored students in medium or high open classrooms (reading, total reading, math computation, problem solving, total math, language, spelling). Only one achievement variable (work knowledge) favored students in conventional classrooms.

While generalizations must be tempered by limitations of the sample, the findings implied that open classrooms, as defined in this study, have a positive impact on white students' perception of the learning environment and their academic achievement. The findings are of particular interest in view of Wright's (1975) report that children in a traditional school in Philadelphia scored higher on achievement variables than did children in an open school. Our data supported Silberman (1970) and other open education advocates who contend that open classrooms are at least as effective academically as traditional classrooms, and may well benefit students in other ways.

Further conceptualization is needed for open education vis a' vis the OETQ, and its relative impact on academic achievement and student perceptions of their learning environment. In addition, research studies should be designed which investigate intervening variables that cause black children to perceive the environment and academically achieve no differently from one setting to the other.

Admittedly, our findings cannot be viewed as conclusive evidence to Dopyrea's (1972) request for proof that programs for which the United States is spending billions of dollars make a difference. Measurable benefits of open education call for much larger accumulations of data in a variety of settings. Indeed the jury is still out and our work should be viewed as a step toward judgement, and not a final judgement in and of itself.

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